

## REMARKS

Claims 2-4, 6-8, and 10-12 13-15 are pending in the application. Dependent Claims 13-15 have been added in the application by this amendment. Support for claims 13-15 can be found in the specification at least on page 10, lines 9-17.

Claims 2, 3, 6, 7, 10, 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the article "A study on a reduction of the transmission Bit Rate by U/V Decision using LSP in the CELP Vocoder" by Lee et al. in view of the article "An Overview of Variable Rate Speech Coding for Cellular Networks" by Gersho et al. (Gersho).

Claims 4, 8 and 12 are rejected under 35 U.S.C. § 103 as being unpatentable over Lee et al. in view of Gersho and further in view of Kang et al. (U.S. Patent 5,448,680).

The present invention relates to a method for reducing a bit rate when vowels continue in a voiced frame in variable rate speech coding. Specifically, LSP coefficients are calculated and intervals between them and their positions are maintained. Whether or not vowels continue is determined utilizing the nature that, in the case of vowels, the intervals between and positions of LSP coefficients are almost the same. If the continuity of vowels is detected, a bit rate is reduced by transmitting only information about the LSP coefficients and pitches.

Lee discloses a method for distinguishing voiced speech from unvoiced speech using LSP coefficients. Gersho discloses the switching of a bit rate. Kang discloses the use of templates.

Although Lee et al. disclose extraction of LSP parameters in Fig. 4 of their article and the vectors of LSPS intervals they fail to show or suggest setting a voice encoding bit if the voice signal is a vowel, to a bit rate usually used when the voice part is sounded. This has been admitted by the Examiner.

Table 1 on page 1000 of the Lee et al. article does not take into consideration the voice signal which is a vowel as clearly set forth in the right column of page 1000 of the Lee et al. article. Lee et al. did get a transmission bit rate reduction up to 5.6 % using both voiced sound and unvoiced sound whereas the rate setting unit of the present invention gets the voice encoding bit rate reduction when the voice part of the voice signal is sounded and if the voice signal is a vowel, contrary to what has been proposed by Lee et al.

In fact, Lee teaches a system for improving the U/V determination accuracy by dividing the range of an LSP coefficient into high and low frequency regions for the purpose of determining U/V, and determining that sound is voiced if the number of LSPs in the lower region is equal to or less than a predetermined threshold value, and also determining that sound is noise, etc., and unvoiced if LSPs are located only in the higher region.

Lee totally fails to teach or suggest a method adopted for the case where vowels continue, which is the subject matter of the present invention. The Examiner also notices this and argues that this can be easily anticipated by combining the teachings of Lee and Gersho. However, neither a detailed method adopted for the case where vowels continue nor bit rate reduction in speech coding are suggested in either reference.

The Office Action asserts that the Gersho article indicates that bits could be saved in encoding sustained vowels sounds.

The Gersho publication is a general paper on a variable rate speech coding system. Gersho discloses that a bit rate can be reduced by the characteristic of a vowel as a kind of source-controlled coder. However, no detailed variable rate speech coding system is disclosed by Gersho.

Although Gersho at page 17, left column, suggest that bits can be saved in encoding sustained vowel sounds whose formant frequencies and pitch period exhibit a slow temporal variation resulting in a large amount of interframe correlation of the spectrum and the pitch, they also suggest that allocating more bits can be obtained with a modest increase in the average bit rate, page 74, left column, the fourth full paragraph.

Gersho as well as Lee et al., taken singly or in combination, fail to show or suggest a rate setting unit or step which sets a voice encoding bit rate, if the voice signal is a vowel to a bit rate lower than the bit rate usually used when the voice part is sounded.

In short, independent claims 2, 6 10 are patentably distinguishable over the prior art as applied and these claims as well as claims 3, 6, 7 and 11 respectively dependent thereon should be allowed.

Regarding the rejection of dependent claims 4, 8, 12 under 35 U.S.C. §103 over Lee et al., in view of Gersho and further in view of Kang et al., it should be noted that Kang et al disclose a coding table as a template in a speech coding system. Reduction in the amount of data can be realized by comparing a template with the gain, etc., of the current frame and transmitting the closest index number.


Contrary to Kang et al, the present invention simply determines its similarity by comparing a template with the LSP coefficient and utilizes the similarity to determine whether or not vowels continue. However, in the case, no index number is transmitted. If it determined that vowels continue, a bit rate can be reduced without degrading communication quality, by reducing a random coding bit rate of a parameter other than an LSP coefficient Kang et al, disclose that they provide a highly efficient rate (col. 7, lines 1-50) but fail to suggest a rate setting unit or step, as claimed in independent claims 2, 6 and 10 of the instant application. Thus

claims 4, 8, and 12 respectively dependent on claims 2, 6, and 10 are also believed to be allowable. Kang et al., even if taken in combination with Lee et al. and Gersho, differs from the present invention not only in the configuration but also in their objective and effect.

In view of the remarks set forth above, this application is in condition for allowance which action is respectfully requested. However, if for any reason the Examiner should consider this application not to be in condition for allowance, the Examiner is respectfully requested to telephone the undersigned attorney at the number listed below prior to issuing a further Action.

Any fee due with this paper may be charged to Deposit Account No. 50-1290.

Respectfully submitted,

  
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